

# SEQUENCE LISTING

<110> Farese, Robert V.  
Cases, Sylvaine  
Smith, Steven  
Erickson, Sandra

<120> Diacylglycerol O-Acyltransferase

<130> 6510-105CIP2

<150> 60/107,771

<151> 1998-11-09

<150> PCT/US98/17883

<151> 1998-08-28

<150> 09/103,754

<151> 1998-06-24

<150> 09/339,472

<151> 1999-06-23

<160> 10

<170> FastSEQ for Windows Version 3.0

<210> 1

<211> 1411

<212> DNA

<213> homo sapiens

<400> 1

|             |             |             |             |            |            |      |
|-------------|-------------|-------------|-------------|------------|------------|------|
| ttatttttgg  | agaacctcat  | caagtatggc  | atcctgggtgg | accccatcca | ggtggtttct | 60   |
| ctgttcctga  | aggatcccta  | tagctggccc  | gccccatgcc  | tggttattgc | ggccaatgtt | 120  |
| tttgctgtgg  | ctgcattcca  | ggttgagaag  | cgccctggcgg | tgggtgccct | gacggagcag | 180  |
| gcgggactgc  | tgetgcacgt  | ggccaacctg  | gccaccattc  | tgtgtttccc | agcggctgtg | 240  |
| gtcttactgg  | ttgagtctat  | cactccagtg  | ggctccctgc  | tggcgctgat | ggcgcacacc | 300  |
| atcctcttcc  | tcaagctctt  | ctcctaccgc  | gacgtcaact  | catggtgccg | cagggccagg | 360  |
| gccaaaggctg | cctctgcagg  | gaagaaggcc  | agcagtgttg  | ctgccccgca | caccgtgagc | 420  |
| taccgggaca  | atctgacctc  | ccgcgatctc  | tactacttcc  | tcttcgcccc | caccttgtgc | 480  |
| tacgagctca  | actttccccg  | ctctccccgc  | atccggaagc  | gctttctgct | gcgacggatc | 540  |
| cttgagatgc  | tgttcttcac  | ccagctccag  | gtggggctga  | tccagcagtg | gatggtcccc | 600  |
| accatccaga  | actccatgaa  | gcccttcaag  | gacatggact  | actcacgcat | catcgagcgc | 660  |
| ctcctgaagc  | tggcggtccc  | caatcacctc  | atctggctca  | tcttcttcta | ctggctcttc | 720  |
| cactcctgcc  | tgaatgccgt  | ggctgagctc  | atgcagtttg  | gagaccggga | gttctaccgg | 780  |
| gactgggtga  | actccgagtc  | tgctcacctac | ttctggcaga  | actggaacat | ccctgtgcac | 840  |
| aagtgggtgca | tcagacactt  | ctacaagccc  | atgcttcgac  | ggggcagcag | caagtggatg | 900  |
| gccaggacag  | gggtgttccct | ggcctcgccc  | ttcttccacg  | agtacctggg | gagcgtccct | 960  |
| ctgcgaatgt  | tccgcctctg  | ggcgttcacg  | ggcatgatgg  | ctcagatccc | actggcctgg | 1020 |
| ttcgtggggc  | gctttttcca  | gggcaactat  | ggcaacgcag  | ctgtgtggct | gtcgctcatc | 1080 |
| atcggacagc  | caatagccgt  | cctcatgtac  | gtccacgact  | actacgtgct | caactatgag | 1140 |
| gccccagcgg  | cagaggcctg  | agctgcacct  | gaggggctgg  | cttctcactg | ccacctcaca | 1200 |
| cccgttgcca  | gagcccacct  | ctcctcctag  | gcctcgagtt  | gctggggatg | ggcctggctg | 1260 |
| cacagcatcc  | tcctctggtc  | ccagggaggc  | ctctctgccc  | ctatggggct | ctgtcctgca | 1320 |
| cccctcaggg  | atggcgacag  | caggccagac  | acagtctgat  | gccagctggg | agtcttctgt | 1380 |
| accctgcccc  | gggtccgagg  | gtgtcaataa  | a           |            |            | 1411 |

|            |            |            |            |            |             |     |
|------------|------------|------------|------------|------------|-------------|-----|
| cagaggcctg | agctgcacct | gaggggctgg | cttctcactg | ccacctcaca | cccgtctggca | 60  |
| gagcccacct | ctcctcctag | gcctcgagtt | gctggggatg | ggcctggctg | cacagcatcc  | 120 |
| tcctctggtc | ccagggaggc | ctctctgccc | ctatggggct | ctgtcctgca | ccccctaggg  | 180 |
| atggcgacag | caggccagac | acagtctgat | gccagctggg | agtcttctg  | accctgcccc  | 240 |
| gggtccgagg | gtgtcaataa | a          |            |            |             | 261 |

```
<210> 3
<211> 1650
<212> DNA
<213> mus musculus
```

|             |             |             |            |             |            |      |
|-------------|-------------|-------------|------------|-------------|------------|------|
| <400> 3     |             |             |            |             |            |      |
| ggatgaatgg  | aaataagtag  | aattaggcac  | acttaggata | gggctcaagc  | cgcggcccg  | 60   |
| gaagattggg  | ccgcgacgag  | gtgcggggcg  | aagccatggg | cgaccgcgga  | ggcgcgggaa | 120  |
| gctctcggcg  | tccgaggacc  | ggctcgcggg  | tttccgtcca | gggtggtagt  | gggccccagg | 180  |
| tagaagagga  | cgaggtgcga  | gacgcgctcg  | tgagccccga | cttgggcgcg  | gggggtgacg | 240  |
| cgcgggctcc  | ggctccggct  | ccagcccata  | cccgggacaa | agacgggcgg  | accagctggg | 300  |
| gcgacggcta  | ctgggatctg  | agggtccatc  | gtctgcaaga | ttctttgttc  | agctcagata | 360  |
| gtggttttcag | caattatcgt  | ggatccctga  | attggtgtgt | ggtgatgctg  | atcctgagta | 420  |
| atgcaagggt  | atTTTTtagag | aaccttatca  | agtatggcat | cctggtggat  | cctatccagg | 480  |
| tgggtgtctct | gtttttgaag  | gacccctaca  | gctggcctgc | cccattgcgtg | attattgcat | 540  |
| ccaatatattt | tgtttgtggct | gcatttcaga  | ttgagaagcg | cctggcagtg  | ggtgccctga | 600  |
| cagagcagat  | ggggctgctg  | ctacatgttg  | ttaacctggc | cacaatcatt  | tgttcccag  | 660  |
| cagctgtggc  | cttactgggt  | gagtcctatc  | ctccagtggg | ttccgtgttt  | gctctggcat | 720  |
| catactccat  | catgttccctc | aagctttatt  | ctcaccggga | tgtccaactg  | tgggtgcgcc | 780  |
| agcgaagggt  | caaggccaaa  | gctgtctcta  | cagggaagaa | ggtcagtggtg | gctgctgcc  | 840  |
| agcaagctgt  | gagctatcca  | gacaacctga  | cctaccgaga | tctctattac  | ttcatctttg | 900  |
| ctcctacttt  | gtgttatgaa  | ctcaactttc  | ctcgggtccc | cgcataacga  | aagcgtttc  | 960  |
| tgctacgacg  | agttcttgag  | atgctctttt  | ttaccagct  | tcaagtgggg  | ctgatccaac | 1020 |
| agtggatggt  | ccctactatc  | cacaactcca  | tgaagccctt | caaggatatg  | gactattcac | 1080 |
| ggatcattga  | gcgtctctta  | aagctggcgg  | tccccaaaca | tctgatctcg  | cttatcttct | 1140 |
| tctatttggt  | tttccactcc  | tgtctcaatg  | ctgtggcaga | gcttctgcag  | tttggagacc | 1200 |
| gcgagtttcta | cagagatttg  | tggaatgctg  | agtctgtcac | ctacttttgg  | cagaactgga | 1260 |
| atatccccgt  | gcacaagtgg  | tgcatacagc  | acttctacaa | gcctatgctc  | agacatggca | 1320 |
| gcagcaaattg | ggtggccagg  | acaggagtat  | ttttgacctc | agccttcttc  | catgagtacc | 1380 |
| tagtgagcgt  | tcccctgcgg  | atgttccgcc  | tctgggcatt | cacagccatg  | atggctcagg | 1440 |
| tcccactggc  | ctggatttgtg | ggccgattct  | tccaagggaa | ctatggcaat  | gcagctgtgt | 1500 |
| gggtgacact  | catcatttggg | caaccggtg   | ctgtgctcat | gtatgtccac  | gactactacg | 1560 |
| tgctcaacta  | cagtgcccca  | gtgggggtat  | gagctactgc | caaaggccag  | ccctccctaa | 1620 |
| cctggggcctg | gagttctgga  | ggggttccctg |            |             |            | 1650 |

```
<210> 4
<211> 629
<212> DNA
<213> arabidopsis thaliana
```

```
<220>  
<221> misc_feature  
<222> (0) ... (0)
```

<223> Each n residue at position 455, 464, 467, 475, 497, 500, 508, 514, 519, 536, 543, 544, 576, 583, 584 and 597 can be either a, c, g or t

```

<400> 4
tgcattgtata cggaagggtt ggggtggctcg tcaatttgca aaactgggtca tattcaccgg      60
attcatggga tttataataa aacaatatat aaatcctatt gtcagggaact caaaacatcc      120

```

```

tttgaagggc gatcttctat atgctattga aagagtgttg aagctttcag ttccaaattt 180
atatgtgtgg ctctgcatgt tctactgctt cttccacctt tgggttaaaca tattggcaga 240
gcttctctgc ttcggggatc gtgaattcta caaagattgg tggaatgcaa aaagtgtggg 300
agattactgg gagaatgtgg aatatgcctg tccataaatg ggatgggtcc gacatatata 360
ccttccccgt gcttgcgcac aaggattacc caaagacacc ccggccatta accattggct 420
ttcccaagcc ccctggaggc ctttccatgg gccanggacc cggngtnccc tggcngggccc 480
ttcaaagcaa agggggnttn cctggggnta aagntccang ggcccttggg gcccanccaa 540
aannttcccc cgggaaaggg ttgcccaccg gggggngaaa aanncccggg ggcaccncgg 600
aatTTTggga acccgggggg ggcctttttt 629

```

<210> 5  
 <211> 386  
 <212> PRT  
 <213> homo sapiens

```

<400> 5
Leu Phe Leu Glu Asn Leu Ile Lys Tyr Gly Ile Leu Val Asp Pro Ile
1 5 10 15
Gln Val Val Ser Leu Phe Leu Lys Asp Pro Tyr Ser Trp Pro Ala Pro
20 25 30
Cys Leu Val Ile Ala Ala Asn Val Phe Ala Val Ala Ala Phe Gln Val
35 40 45
Glu Lys Arg Leu Ala Val Gly Ala Leu Thr Glu Gln Ala Gly Leu Leu
50 55 60
Leu His Val Ala Asn Leu Ala Thr Ile Leu Cys Phe Pro Ala Ala Val
65 70 75 80
Val Leu Leu Val Glu Ser Ile Thr Pro Val Gly Ser Leu Leu Ala Leu
85 90 95
Met Ala His Thr Ile Leu Phe Leu Lys Leu Phe Ser Tyr Arg Asp Val
100 105 110
Asn Ser Trp Cys Arg Arg Ala Arg Ala Lys Ala Ala Ser Ala Gly Lys
115 120 125
Lys Ala Ser Ser Val Ala Ala Pro His Thr Val Ser Tyr Pro Asp Asn
130 135 140
Leu Thr Tyr Arg Asp Leu Tyr Tyr Phe Leu Phe Ala Pro Thr Leu Cys
145 150 155 160
Tyr Glu Leu Asn Phe Pro Arg Ser Pro Arg Ile Arg Lys Arg Phe Leu
165 170 175
Leu Arg Arg Ile Leu Glu Met Leu Phe Phe Thr Gln Leu Gln Val Gly
180 185 190
Leu Ile Gln Gln Trp Met Val Pro Thr Ile Gln Asn Ser Met Lys Pro
195 200 205
Phe Lys Asp Met Asp Tyr Ser Arg Ile Ile Glu Arg Leu Leu Lys Leu
210 215 220
Ala Val Pro Asn His Leu Ile Trp Leu Ile Phe Phe Tyr Trp Leu Phe
225 230 235 240
His Ser Cys Leu Asn Ala Val Ala Glu Leu Met Gln Phe Gly Asp Arg
245 250 255
Glu Phe Tyr Arg Asp Trp Trp Asn Ser Glu Ser Val Thr Tyr Phe Trp
260 265 270
Gln Asn Trp Asn Ile Pro Val His Lys Trp Cys Ile Arg His Phe Tyr
275 280 285
Lys Pro Met Leu Arg Arg Gly Ser Ser Lys Trp Met Ala Arg Thr Gly
290 295 300
Val Phe Leu Ala Ser Ala Phe Phe His Glu Tyr Leu Val Ser Val Pro
305 310 315 320
Leu Arg Met Phe Arg Leu Trp Ala Phe Thr Gly Met Met Ala Gln Ile
325 330 335
Pro Leu Ala Trp Phe Val Gly Arg Phe Phe Gln Gly Asn Tyr Gly Asn
340 345 350
Ala Ala Val Trp Leu Ser Leu Ile Ile Gly Gln Pro Ile Ala Val Leu

```

355 360 365  
Met Tyr Val His Asp Tyr Tyr Val Leu Asn Tyr Glu Ala Pro Ala Ala  
370 375 380  
Glu Ala  
385

<210> 6  
<211> 488  
<212> PRT  
<213> homo sapiens

<400> 6  
Met Gly Asp Arg Gly Ser Ser Arg Arg Arg Arg Thr Gly Ser Arg Pro  
1 5 10 15  
Ser Ser His Gly Gly Gly Gly Pro Ala Ala Ala Glu Glu Glu Val Arg  
20 25 30  
Asp Ala Ala Ala Gly Pro Asp Val Gly Ala Ala Gly Asp Ala Pro Ala  
35 40 45  
Pro Ala Pro Asn Lys Asp Gly Asp Ala Gly Val Gly Ser Gly His Trp  
50 55 60  
Glu Leu Arg Cys His Arg Leu Gln Asp Ser Leu Phe Ser Ser Asp Ser  
65 70 75 80  
Gly Phe Ser Asn Tyr Arg Gly Ile Leu Asn Trp Cys Val Val Met Leu  
85 90 95  
Ile Leu Ser Asn Ala Arg Leu Phe Leu Glu Asn Leu Ile Lys Tyr Gly  
100 105 110  
Ile Leu Val Asp Pro Ile Gln Val Val Ser Leu Phe Leu Lys Asp Pro  
115 120 125  
His Ser Trp Pro Ala Pro Cys Leu Val Ile Ala Ala Asn Val Phe Ala  
130 135 140  
Val Ala Ala Phe Gln Val Glu Lys Arg Leu Ala Val Gly Ala Leu Thr  
145 150 155 160  
Glu Gln Ala Gly Leu Leu Leu His Val Ala Asn Leu Ala Thr Ile Leu  
165 170 175  
Cys Phe Pro Ala Ala Val Val Leu Leu Val Glu Ser Ile Thr Pro Val  
180 185 190  
Gly Ser Leu Leu Ala Leu Met Ala His Thr Ile Leu Phe Leu Lys Leu  
195 200 205  
Phe Ser Tyr Arg Asp Val Asn Ser Trp Cys Arg Arg Ala Arg Ala Lys  
210 215 220  
Ala Ala Ser Ala Gly Lys Lys Ala Ser Ser Ala Ala Ala Pro His Thr  
225 230 235 240  
Val Ser Tyr Pro Asp Asn Leu Thr Tyr Arg Asp Leu Tyr Tyr Phe Leu  
245 250 255  
Phe Ala Pro Thr Leu Cys Tyr Glu Leu Asn Phe Pro Arg Ser Pro Arg  
260 265 270  
Ile Arg Lys Arg Phe Leu Leu Arg Arg Ile Leu Glu Met Leu Phe Phe  
275 280 285  
Thr Gln Leu Gln Val Gly Leu Ile Gln Gln Trp Met Val Pro Thr Ile  
290 295 300  
Gln Asn Ser Met Lys Pro Phe Lys Asp Met Asp Tyr Ser Arg Ile Ile  
305 310 315 320  
Glu Arg Leu Leu Lys Leu Ala Val Pro Asn His Leu Ile Trp Leu Ile  
325 330 335  
Phe Phe Tyr Trp Leu Phe His Ser Cys Leu Asn Ala Val Ala Glu Leu  
340 345 350  
Met Gln Phe Gly Asp Arg Glu Phe Tyr Arg Asp Trp Trp Asn Ser Glu  
355 360 365  
Ser Val Thr Tyr Phe Trp Gln Asn Trp Asn Ile Pro Val His Lys Trp  
370 375 380  
Cys Ile Arg His Phe Tyr Lys Pro Met Leu Arg Arg Gly Ser Ser Lys



```

          325          330          335
Leu Ala Val Pro Asn His Leu Ile Trp Leu Ile Phe Phe Tyr Trp Phe
          340          345          350
Phe His Ser Cys Leu Asn Ala Val Ala Glu Leu Leu Gln Phe Gly Asp
          355          360          365
Arg Glu Phe Tyr Arg Asp Trp Trp Asn Ala Glu Ser Val Thr Tyr Phe
          370          375          380
Trp Gln Asn Trp Asn Ile Pro Val His Lys Trp Cys Ile Arg His Phe
          385          390          395
Tyr Lys Pro Met Leu Arg His Gly Ser Ser Lys Trp Val Ala Arg Thr
          405          410          415
Gly Val Phe Leu Thr Ser Ala Phe Phe His Glu Tyr Leu Val Ser Val
          420          425          430
Pro Leu Arg Met Phe Arg Leu Trp Ala Phe Thr Ala Met Met Ala Gln
          435          440          445
Val Pro Leu Ala Trp Ile Val Gly Arg Phe Phe Gln Gly Asn Tyr Gly
          450          455          460
Asn Ala Ala Val Trp Val Thr Leu Ile Ile Gly Gln Pro Val Ala Val
          465          470          475
Leu Met Tyr Val His Asp Tyr Tyr Val Leu Asn Tyr Asp Ala Pro Val
          485          490          495
Gly Val

```

```

<210> 8
<211> 10
<212> PRT
<213> Artificial Sequence

```

```

<220>
<223> synthetic peptide-FLAG epitope

```

```

<400> 8
Met Gly Asp Tyr Lys Asp Asp Asp Asp Gly
1          5          10

```

```

<210> 9
<211> 1650
<212> DNA
<213> mus musculus

```

```

<400> 9
ggatgaatgg aaataagtag aattagggcat acttaggata gggctcaagc cgcggcccgt      60
gaagattggg cgcgcagcag gtgcggggccg aagccatggg cgaccgcgga ggcgcgggaa      120
gctctcggcg tcggaggacc ggctcgcggg tttccgtcca ggtggtagt gggcccaagg      180
tagaagagga cgaggtgcga gacgcggctg tgagccccga cttgggcgcc gggggtgacg      240
cgccggctcc ggctccggct ccagcccata cccgggacaa agacgggcgg accagcgtgg      300
gcgacggcta ctgggatctg aggtgccatc gtctgcaaga ttctttgttc agctcagaca      360
gtgggtttcag caattatcgt ggtatcctga attggtgtgt ggtgatgctg atcctgagta      420
atgcaagggtt attttttagag aaccttatca agtatggcat cctggtggat cctatccagg      480
tggtgtctct gtttttgaag gacccctaca gctggcctgc cccatgcgtg attattgcat      540
ccaatathtt tgttgtggct gcatttcaga ttgagaagcg cctggcagtg ggtgcctga      600
cagagcagat ggggctgctg ctacatgtgg ttaacctggc cacaatcatt tgcttcccag      660
cagctgtggc cttactggtt gagtctatca ctccagtggg ttccgtgttt gctctggcat      720
catactccat catgttcttc aagctttatt cctaccggga tgtcaacctg tgggtgccgc      780
agcgaagggt caaggccaaa gctgtctcta cagggaagaa ggtcagtggt gctgctgcc      840
agcaagctgt gagctatcca gacaacctga cctaccgaga tctctattac ttcattcttg      900
ctcctacttt gtgttatgaa ctcaactttc ctcggtcccc cgcaatacga aagcgctttc      960
tgctacgacg agttcttgag atgctctttt ttaccagct tcaagtgggg ctgatccaac      1020
agtggatggt ccctactatc cacaactcca tgaagccctt caaggatatg gactattcac      1080
ggatcattga gcgtctctta aagctggcgg tccccaacca tctgatctgg cttatcttct      1140

```

|             |            |            |            |            |            |      |
|-------------|------------|------------|------------|------------|------------|------|
| tctattggtt  | tttccactcc | tgtctcaatg | ctgtggcaga | gcttctgcag | tttggagacc | 1200 |
| gcgagttcta  | cagagattgg | tggaatgctg | agtctgtcac | ctacttttgg | cagaactgga | 1260 |
| atatccccgt  | gcacaagtgg | tgcacagac  | acttctacaa | gcctatgctc | agacatggca | 1320 |
| gcagcaaata  | ggtggccagg | acaggagtat | ttttgacctc | agccttcttc | catgagtacc | 1380 |
| tagtgagcgt  | tccccctg   | atgttccgcc | tctgggcatt | cacagccatg | atggctcagg | 1440 |
| tcccaactggc | ctggattgtg | ggccgattct | tccaagggaa | ctatggcaat | gcagctgtgt | 1500 |
| gggtgacact  | catcattggg | caaccgggtg | ctgtgctcat | gtatgtccac | gactactacg | 1560 |
| tgctcaacta  | cgatgcccc  | gtgggggtat | gagctactgc | caaaggccag | ccctccctaa | 1620 |
| cctgggacctg | gagttctgga | ggggttcctg |            |            |            | 1650 |

<210> 10  
 <211> 498  
 <212> PRT  
 <213> mus musculus

<400> 10

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Gly | Asp | Arg | Gly | Ala | Gly | Ser | Ser | Arg | Arg | Arg | Arg | Thr | Gly |
| 1   |     |     |     | 5   |     |     |     | 10  |     |     |     |     | 15  |     |
| Ser | Arg | Val | Ser | Val | Gln | Gly | Gly | Ser | Gly | Pro | Lys | Val | Glu | Asp |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     | 30  |     |     |
| Glu | Val | Arg | Asp | Ala | Ala | Val | Ser | Pro | Asp | Leu | Gly | Ala | Gly | Asp |
|     |     |     | 35  |     |     |     | 40  |     |     |     |     | 45  |     |     |
| Ala | Pro | Ala | Pro | Ala | Pro | Ala | Pro | Ala | His | Thr | Arg | Asp | Lys | Asp |
|     |     |     | 50  |     |     | 55  |     |     |     |     | 60  |     |     |     |
| Arg | Thr | Ser | Val | Gly | Asp | Gly | Tyr | Trp | Asp | Leu | Arg | Cys | His | Arg |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     | 80  |
| Gln | Asp | Ser | Leu | Phe | Ser | Ser | Asp | Ser | Gly | Phe | Ser | Asn | Tyr | Arg |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     | 95  |     |
| Ile | Leu | Asn | Trp | Cys | Val | Val | Met | Leu | Ile | Leu | Ser | Asn | Ala | Arg |
|     |     |     |     | 100 |     |     |     | 105 |     |     |     |     | 110 |     |
| Phe | Leu | Glu | Asn | Leu | Ile | Lys | Tyr | Gly | Ile | Leu | Val | Asp | Pro | Ile |
|     |     |     | 115 |     |     |     | 120 |     |     |     |     | 125 |     |     |
| Val | Val | Ser | Leu | Phe | Leu | Lys | Asp | Pro | Tyr | Ser | Trp | Pro | Ala | Pro |
|     |     |     | 130 |     |     | 135 |     |     |     |     | 140 |     |     | Cys |
| Val | Ile | Ile | Ala | Ser | Asn | Ile | Phe | Val | Val | Ala | Ala | Phe | Gln | Ile |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     | 160 |
| Lys | Arg | Leu | Ala | Val | Gly | Ala | Leu | Thr | Glu | Gln | Met | Gly | Leu | Leu |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     | 175 |     |
| His | Val | Val | Asn | Leu | Ala | Thr | Ile | Ile | Cys | Phe | Pro | Ala | Ala | Val |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |
| Leu | Leu | Val | Glu | Ser | Ile | Thr | Pro | Val | Gly | Ser | Val | Phe | Ala | Leu |
|     |     |     | 195 |     |     |     | 200 |     |     |     |     | 205 |     |     |
| Ser | Tyr | Ser | Ile | Met | Phe | Leu | Lys | Leu | Tyr | Ser | Tyr | Arg | Asp | Val |
|     |     |     | 210 |     |     | 215 |     |     |     |     | 220 |     |     | Asn |
| Leu | Trp | Cys | Arg | Gln | Arg | Arg | Val | Lys | Ala | Lys | Ala | Val | Ser | Thr |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     | 240 |
| Lys | Lys | Val | Ser | Gly | Ala | Ala | Ala | Gln | Gln | Ala | Val | Ser | Tyr | Pro |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |
| Asn | Leu | Thr | Tyr | Arg | Asp | Leu | Tyr | Tyr | Phe | Ile | Phe | Ala | Pro | Thr |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |
| Cys | Tyr | Glu | Leu | Asn | Phe | Pro | Arg | Ser | Pro | Arg | Ile | Arg | Lys | Arg |
|     |     |     | 275 |     |     |     | 280 |     |     |     |     | 285 |     | Phe |
| Leu | Leu | Arg | Arg | Val | Leu | Glu | Met | Leu | Phe | Phe | Thr | Gln | Leu | Gln |
|     |     |     | 290 |     |     | 295 |     |     |     |     | 300 |     |     | Val |
| Gly | Leu | Ile | Gln | Gln | Trp | Met | Val | Pro | Thr | Ile | His | Asn | Ser | Met |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     | 320 |
| Pro | Phe | Lys | Asp | Met | Asp | Tyr | Ser | Arg | Ile | Ile | Glu | Arg | Leu | Leu |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |
| Leu | Ala | Val | Pro | Asn | His | Leu | Ile | Trp | Leu | Ile | Phe | Phe | Tyr | Trp |
|     |     |     | 340 |     |     |     | 345 |     |     |     |     |     | 350 | Phe |
| Phe | His | Ser | Cys | Leu | Asn | Ala | Val | Ala | Glu | Leu | Leu | Gln | Phe | Gly |
|     |     |     |     |     |     |     |     |     |     |     |     |     |     | Asp |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|     |     | 355 |     |     |     | 360 |     |     |     | 365 |     |     |     |     |     |
| Arg | Glu | Phe | Tyr | Arg | Asp | Trp | Trp | Asn | Ala | Glu | Ser | Val | Thr | Tyr | Phe |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Trp | Gln | Asn | Trp | Asn | Ile | Pro | Val | His | Lys | Trp | Cys | Ile | Arg | His | Phe |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
| Tyr | Lys | Pro | Met | Leu | Arg | His | Gly | Ser | Ser | Lys | Trp | Val | Ala | Arg | Thr |
|     |     |     | 405 |     |     |     |     |     | 410 |     |     |     |     | 415 |     |
| Gly | Val | Phe | Leu | Thr | Ser | Ala | Phe | Phe | His | Glu | Tyr | Leu | Val | Ser | Val |
|     |     | 420 |     |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| Pro | Leu | Arg | Met | Phe | Arg | Leu | Trp | Ala | Phe | Thr | Ala | Met | Met | Ala | Gln |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
| Val | Pro | Leu | Ala | Trp | Ile | Val | Gly | Arg | Phe | Phe | Gln | Gly | Asn | Tyr | Gly |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |
| Asn | Ala | Ala | Val | Trp | Val | Thr | Leu | Ile | Ile | Gly | Gln | Pro | Val | Ala | Val |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |
| Leu | Met | Tyr | Val | His | Asp | Tyr | Tyr | Val | Leu | Asn | Tyr | Asp | Ala | Pro | Val |
|     |     |     | 485 |     |     |     |     |     | 490 |     |     |     |     | 495 |     |
| Gly | Val |     |     |     |     |     |     |     |     |     |     |     |     |     |     |